



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,053	09/29/2003	Kurt Ulmer	200210246-02	2572

7590 02/11/2008
HEWLETT-PACKARD DEVELOPMENT COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

LEWIS, BEN

ART UNIT	PAPER NUMBER
----------	--------------

1795

MAIL DATE	DELIVERY MODE
-----------	---------------

02/11/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/674,053	Applicant(s) ULMER ET AL.	
	Examiner Ben Lewis	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10/29/07.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-7,24,25 and 28-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-7,24,25 and 28-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. It is not clear to the Examiner how Applicant is able to switch from series to parallel using only two fuel cells as claimed in claim 1.

4. The phrase "A fuel cell system configured to control temperature" in claim 1 renders the claim indefinite because it is unclear as to what this phrase encompasses. It is unclear to the examiner as to what Applicants' temperature control is directed to.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 1, 3-7 and 28-45 rejected under 35 U.S.C. 103(a) as being unpatentable over (U.S. Pub. No. 2003/0008184 A1).

With respect to claims 1, 28, 34 and 40, Ballantine et al. disclose a method and apparatus for controlling a combined heat and power fuel cell system (title).

Regarding the function of the controller, Ballantine et al. teach a controller is adapted to coordinate response to data signals from the power sink and the heat sink. As examples, such data signals from the heat sink may include a temperature indication or a heat demand signal (such as from a thermostat), and such data signals from the power sink may include a voltage or current measurement, an electrical power demand signal, or an electrical load (Paragraph 0013).

Regarding the function of the switch circuit, Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

With respect to a temperature measurement circuit, Ballentine et al. teach that a controller is adapted to coordinate response to data signals from the power sink and the heat sink. As examples, such data signals from the heat sink may include a temperature indication or a heat demand signal (such as from a thermostat), and such data signals from the power sink may include a voltage or current measurement, an electrical power demand signal, or an electrical load (Paragraph 0013).

Ballentine et al. do not specifically teach switching to a more serial if more heat is required and switching to a more parallel configuration if less heat is required. However, in the system of Ballentine et al. all the elements are present therefore it would have been obvious one of ordinary skill in the art at the time the invention was made to switch the fuel cell system of Ballentine et al. in the same manner as claimed by applicant since applicant claimed an apparatus an all the elements of applicant's claimed apparatus are present in the fuel cell system of Ballentine et al.

With respect to claims 4, 6 and 7, Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the

system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

With respect to claim 5, Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

With respect to a temperature measurement circuit, Ballentine et al. teach that teach a controller is adapted to coordinate response to data signals from the power sink and the heat sink. As examples, such data signals from the heat sink may include a temperature indication or a heat demand signal (such as from a thermostat), and such

Art Unit: 1795

data signals from the power sink may include a voltage or current measurement, an electrical power demand signal, or an electrical load (Paragraph 0013).

With respect to claim 29, Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

With respect to claim 30, Ballantine et al. teach that the system also performs a check 612 for a heat demand signal. If there is no heat demand signal, the system continues in optimization mode 610. Where there is a heat demand signal, the system then performs an increase 614 in the reactant flow rates. For example, in this example, for a constant power demand, increasing the fuel flow rate will increase the amount of unreacted fuel in the fuel cell exhaust that is processed in the oxidizer to generate heat (Paragraph 0079).

With respect to claims 31-33, 35 and 44, Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

With respect to a temperature measurement circuit, Ballantine et al. teach that teach a controller is adapted to coordinate response to data signals from the power sink and the heat sink. As examples, such data signals from the heat sink may include a temperature indication or a heat demand signal (such as from a thermostat), and such data signals from the power sink may include a voltage or current measurement, an electrical power demand signal, or an electrical load (Paragraph 0013).

Ballantine et al. teach that the system also performs a check 612 for a heat demand signal. If there is no heat demand signal, the system continues in optimization mode 610. Where there is a heat demand signal, the system then performs an increase 614 in the reactant flow rates. For example, in this example, for a constant power

Art Unit: 1795

demand, increasing the fuel flow rate will increase the amount of unreacted fuel in the fuel cell exhaust that is processed in the oxidizer to generate heat (Paragraph 0079).

With respect to claims 37 and 43, Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

With respect to a temperature measurements, Ballentine et al. teach that a controller is adapted to coordinate response to data signals from the power sink and the heat sink. As examples, such data signals from the heat sink may include a temperature indication or a heat demand signal (such as from a thermostat), and such data signals from the power sink may include a voltage or current measurement, an electrical power demand signal, or an electrical load (Paragraph 0013).

With respect to claims 38, Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

With respect to a temperature measurement circuit, Ballantine et al. teach that teach a controller is adapted to coordinate response to data signals from the power sink and the heat sink. As examples, such data signals from the heat sink may include a temperature indication or a heat demand signal (such as from a thermostat), and such data signals from the power sink may include a voltage or current measurement, an electrical power demand signal, or an electrical load (Paragraph 0013).

Ballantine et al. teach that the system also performs a check 612 for a heat demand signal. If there is no heat demand signal, the system continues in optimization mode 610. Where there is a heat demand signal, the system then performs an increase 614 in the reactant flow rates. For example, in this example, for a constant power

Art Unit: 1795

demand, increasing the fuel flow rate will increase the amount of unreacted fuel in the fuel cell exhaust that is processed in the oxidizer to generate heat (Paragraph 0079).

With respect to claims 39, 41, 42 and 45 Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

Ballantine et al. teach that the system also performs a check 612 for a heat demand signal. If there is no heat demand signal, the system continues in optimization mode 610. Where there is a heat demand signal, the system then performs an increase 614 in the reactant flow rates. For example, in this example, for a constant power demand, increasing the fuel flow rate will increase the amount of unreacted fuel in the fuel cell exhaust that is processed in the oxidizer to generate heat (Paragraph 0079).

7. Claim 24 is rejected under rejected under 35 U.S.C. 103(a) as being unpatentable over (U.S. Pub. No. 2003/0008184 A1).

With respect to claim 24, Ballantine et al. disclose a method and apparatus for controlling a combined heat and power fuel cell system (title).

Regarding means for supplying an excess amount of fuel and producing heat from the excess amount of fuel, Ballantine et al. teach that the system also performs a check 612 for a heat demand signal. If there is no heat demand signal, the system continues in optimization mode 610. Where there is a heat demand signal, the system then performs an increase 614 in the reactant flow rates. For example, in this example, for a constant power demand, increasing the fuel flow rate will increase the amount of unreacted fuel in the fuel cell exhaust that is processed in the oxidizer to generate heat (Paragraph 0079).

Regarding means for switching Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being

connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

Ballentine et al. do not specifically teach switching to a more serial if more heat is required and switching to a more parallel configuration if less heat is required. However, in the system of Ballentine et al. all the elements are present therefore it would have been obvious one of ordinary skill in the art at the time the invention was made to switch the fuel cell system of Ballentine et al. in the same manner as claimed by applicant since applicant claimed an apparatus and all the elements of applicant's claimed apparatus are present in the fuel cell system of Ballentine et al.

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over (U.S. Pub. No. 2003/0008184 A1).

With respect to claim 25, Ballantine et al. disclose a method and apparatus for controlling a combined heat and power fuel cell system (title).

Regarding means for supplying a constant amount of fuel and producing heat from the excess amount of fuel, Ballantine et al. teach that the system also performs a check 612 for a heat demand signal. If there is no heat demand signal, the system continues in optimization mode 610. Where there is a heat demand signal, the system then performs an increase 614 in the reactant flow rates. For example, in this example, for a constant power demand, increasing the fuel flow rate will increase the amount of unreacted fuel in the fuel cell exhaust that is processed in the oxidizer to generate heat (Paragraph 0079).

Regarding means for switching Ballantine et al. teach that the invention provides an embodiment where the balance between the heat and power demand signals is accommodated by selectively connecting at least two fuel cells within a group to increase the amount of heat that is generated for a given amount of power production. Where a system is adapted to selectively connect one or more cells in parallel, the cells that are selectively connected are connected via a switched network, rather than being stack in series as in a conventional stack. For example, two fuel cells may be connected to a switch that is connected to two electrical paths. When the system controller causes the switch to select one of the paths, this results in the cell being connected in series with another cell. When the other path is selected, the cell will be connected in parallel (e.g., connected to a common bus) (Paragraph 0130).

Regarding means for reducing fuel efficiency, Ballantine et al. teach that in another embodiment, the method includes shorting at least one fuel cell within the fuel cell stack in response to a control signal to provide additional heat into a fuel cell stack coolant fluid. In another embodiment, the method may include selectively electrically connecting fuel cells in a low efficiency mode (e.g., some cells in parallel rather than in series) in response to a control signal (e.g., a heat demand signal as from a thermostat) to provide additional heat into a fuel cell stack coolant fluid (Paragraph 0095).

Regarding means for increasing EMF efficiency, Ballantine et al. teach that referring to FIG. 7, another flow diagram 700 is shown of a control scheme for a CHP fuel cell system to illustrate various logical options that may be implemented by a system to balance a combination of heat and power demand signals. In a first state

Art Unit: 1795

702, there is a power demand, but no heat demand. In response, the system lowers the reactant flow rates in step 704 to a point where the power demand can still be met.

Step 704 serves to maximize fuel efficiency. In this mode, the system also exhausts its waste heat to ambient in a step 706 (e.g., the environment outside the fuel cell system, or to the atmosphere) (Paragraph 0082).

Ballentine et al. do not specifically teach switching to a more serial if more heat is required and switching to a more parallel configuration if less heat is required.

However, in the system of Ballentine et al. all the elements are present therefore it would have been obvious one of ordinary skill in the art at the time the invention was made to switch the fuel cell system of Ballentine et al. in the same manner as claimed by applicant since applicant claimed an apparatus and all the elements of applicant's claimed apparatus are present in the fuel cell system of Ballentine et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481.

The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1795

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795